**PART III - Information Pathways Reading List**

Chapter 24 – Genes and Chromosomes

24.1 Chromosomal Elements

* All sub-sections are important

24.2 DNA Supercoiling

The following sub-sections are important:

* The Introduction
* Topoisomerases Catalyze Changes in the Linking Number of DNA. There is more detail in this section than you need to know, the lecture notes and the homework

on topoisomerases contains all the info you need to know on topoisomerases.

* DNA Compaction Requires a Special from of Supercoiling

24.3 The Structure of Chromosomes

The following sub-sections are important:

* The Introduction
* Chromatin Consists of DNA and Proteins
* Histones are Small, Basic Proteins
* Nucleosomes are Fundamental Organizational Units of Chromatin
* Nucleosomes are Packed into Highly Condensed Chromosome Structures
* Condensed Chromosome Structures Are Maintained by SMC Proteins

Chapter 25 – DNA Metabolism

25.1 DNA Replication

The following sub-sections are important:

* The Introduction
* DNA Replication Follows a Set of Fundamental Rules
* DNA Is Degraded By Nucleases
* DNA Is Synthesized by Polymerases
* Replication is Very Accurate
* E.coli has at Least Five DNA Polymerases
* DNA Replication Requires Many Enzymes and Protein Factors
* Replication of the E. coli Chromosome Proceeds in Stages. There is an absolutely exorbitant amount of information in this section. You do not need to know everything in the text, but you do need to be comfortable with what is occurring in each stage and the proteins involved. Figures 25-12, 25-13, 25-14, and 25-15 cover this best.
* Replication in Eukaryotic Cells is Similar but More Complex

25.2 DNA Repair

The following sub-sections are important:

* The Introduction
* Mutations are Linked to Cancer
* All Cells Have Multiple Repair Systems

Chapter 26 – RNA Metabolism

26.1 DNA-Dependent Synthesis of RNA

The following sub-sections are important:

* The Introduction
* RNA is synthesized by RNA Polymerases
* RNA synthesis Begins at Promoters
* Transcription of Regulated at Several Levels
* Specific Sequences Signal Termination
* Eukaryotic Cells Have Three Kinds of Nuclear RNA Polymerase
* RNA Polymerase II Requires Many Other Protein Factors for its Activity

26.2 RNA Processing

The following sub-sections are important:

* The Introduction
* Eukaryotic mRNAs Are Capped at the 5’ End
* Both Introns and Exons are Transcribed from DNA to RNA
* RNA Catalyzes the Splicing of Introns. You do not need to know all the different mechanisms that are discussed in this section, just make sure you understand what splicing is, and the different classes of introns
* Eukaryotic mRNAs Have a Distinctive 3’ End Structure
* A Gene Can Give Rise to Multiple Products by Differential RNA Processing

Chapter 27 – Protein Metabolism

27.1 The Genetic Code

The following sub-sections are important:

27.2 Protein Synthesis

The following sub-sections are important:

* The Introduction
* Protein Biosynthesis Takes Place in Five Stages
* The Ribosome is a Complex Supramolecules Machine
* Transfer RNAs Have Characteristic Structural Features
* Stage 1: Amino-tRNA Synthetases Attach the Correct Amino Acids
* Stage 2: A Specific Amino Acid Initiates Protein Synthesis
* Stage 3: Peptide Bonds are Formed in the Elongation Stage
* Stage 4: Termination of the Polypeptide Synthesis Requires a Special Signal
* Stage 5: Newly Synthesized Polypeptide Chains Undergo Folding and Processing

Chapter 28 – Regulation of Gene Expression

28.1 Principles of Gene Expression

The following sub-sections are important:

* The Introduction
* RNA Polymerase Binds to DNA at Promotors
* Transcription is Regulated by Proteins and RNAs
* Many Bacterial Genes are Clustered and Regulated by Operons
* Regulatory Protein Have Discrete DNA-Binding Domains

28.2 Regulation of Gene Expression in Bacteria

The following sub-sections are important:

* The Introduction
* The lac Operon Undergoes Positive Regulation
* Many Genes of Amino Acid Biosynthesis Enzymes are Regulated by Transcription Attenuation

Chapter 9 – DNA Based Information Technology (and part of Chapter 8 – Nucleotides and Nucleic Acids)

8.3 Nucleic Acids Chemistry

The following sub-sections are important:

* The Chemical Synthesis of DNA has Been Automated
* Gene Sequences Can be Amplified with the Polymerase Chain Reaction
* DNA Sequencing Technologies are Advancing Rapidly

9.1 Studying Genes and Their Products

The following sub-sections are important:

* The Introduction
* Restriction Endonucleases and DNA Ligases Yield Recombinant DNA
* Cloning Vectors Allow Amplification of Inserted DNA Segments
* Cloned Genes Can be Expressed in Amplify Protein Production
* The Polymerase Chain Reaction Can be Adapted for Convenient Cloning

9.2 Using DNA-Based Methods to Understand Protein Function

The following sub-sections are important:

* DNA Libraries are Specialized Catalogs of Genetic Information
* Fusion Proteins and Immunofluorescence Can Reveal the Location of Protein in Cells
* DNA Microarrays Reveal RNA Expression Patterns and Other Information
* Inactivating or Altering a Gene with CRISPR Can Revel Gene Function